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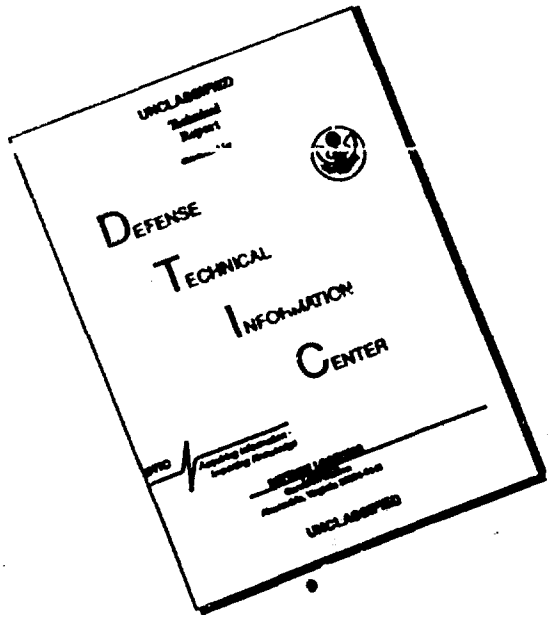

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RUST OF CEREALS

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Rust of Cereals
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The harvest lost due to rust in 1964 in the USSR constituted an average of 4.24% for rye, 3.25% for winter wheat, 3.76% for spring wheat, 3.62 for barley, and 0.86% for oat crops. The data on harvest lost in different natural economic zones are given in Table 1, while information about areas of moderate and epiphytotic development of pathology is given in Table 2.

Brown rye rust (Puccinia dispersa Erikss. et Henn.) was observed in all areas. There is very intensive development of the disease in Orlovskaya Oblast (60%) and in Ul'yanovka cultivar in Bashkir Autonomous SSR (71%). Maximum harvest losses (2.66%) were observed in the Zone of Reclamation ["assimilation"] of Virgin and Waste Lands.

Brown wheat mildew (Puccinia triticina Erikss) developed quite intensively. Epiphytic outbreaks involving winter wheat have been observed in several oblasts of the Steppe zone. The very severe invasion in Zaporozhskaya Oblast caused a 20% drop in the harvest. Profuse nitrogen supplements in the spring often intensified susceptibility in a number of oblasts. The influence of amount of precipitation during the vegetation period on susceptibility of plants to mildew in Azerbaydzhan was rather clearly detected in connection with vertical zonality (Table 3). The most marked difference in development of rust fungi was noted between the lowland (where there was 41% precipitation) and mountainous (92%) parts of the country. In North Osetiya, at the Mosdok GSU [expansion unknown] 85 to 100% of Mironovskaya 808, Michurinka, Novomichurinka and Stavropol'skaya 4 cultivars were affected, but only 12% of Bezostaya [awnless] 1.

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Table 1

Grain harvest losses due to rust in 1964 in different zones of USSR (%)

Зона (a)	Озимая рожь (b)			Озимая пшеница (c)			Яровая пшеница (d)			Ячмень (e)			Овес (f)	
	бурая ржавчина (g)	желтая ржавчина (h)	линейная ржавчина (i)	бурая ржавчина (g)	желтая ржавчина (h)	линейная ржавчина (i)	бурая ржавчина (g)	желтая ржавчина (h)	линейная ржавчина (i)	карликовая ржавчина (j)	желтая ржавчина (h)	линейная ржавчина (i)	карликовая ржавчина (k)	линейная ржавчина (i)
Северная (l)	2,34	0	3,20	1,60	0	0	4,14	0	0	0,80	0	0	0,20	—
Нечерноземная (m)	1,60	0,43	5,80	1,59	1,00	3,32	1,66	0,96	0	0,81	0,60	0	0,24	0
Северного Поволжья (n)	2,35	0	0,72	3,16	0,25	0	4,83	0,36	0	2,10	0	1,80	1,25	2,00
Лесостепная (o)	1,55	1,34	0,57	1,19	0,21	0,98	2,33	4,63	2,08	0,50	0,03	0,08	0,19	0
Степная (p)	0,97	0	0,50	2,10	0,27	0,55	1,86	0,10	0,03	0,30	0,25	0	0	0
Закавказская (q)	—	—	—	1,50	1,50	0,50	—	—	—	0,50	1,70	—	—	—
Освоения целинных и залежных земель (r)	2,66	—	1,18	—	—	—	4,31	0,10	1,48	3,00	0	4,00	1,60	0,50
Восточной Сибири и Забайкалья (s)	—	—	—	—	—	—	0,23	0	0,70	4,50	0	4,00	0	0
Дальневосточная (t)	—	—	—	—	—	—	0	0	2,67	1,47	0	4,00	0	0,50
Среднеазиатская (u)	—	—	—	0,75	2,37	0	0,75	0,68	0	0	4,28	0	—	—
В среднем по СССР в 1964 г. (v)	1,90	0,35	2,00	1,69	0,80	0,76	2,23	0,76	0,77	1,40	0,68	1,54	0,43	0,43
В среднем по СССР в 1963 г. (w)	0,69	0,33	1,04	1,28	3,21	2,45	0,19	0,10	0,64	0,46	0,22	0,61	0,04	0,58

Legend:

a) zone
b) winter rye
c) winter wheat
d) spring wheat
e) barley
f) oats
g) brown rust
h) yellow rust
i) common rust
j) dwarf rust
k) crown rust
l) Northern
m) Nonchernozem
n) Northern Povolzh'ye
o) Forest-steppe
p) Steppe
q) Transcaucasian
r) Reclamation of virgin and waste lands
s) Northern Siberia and Trans-Baykal
t) Far Eastern
u) Central Asian
v) 1964 mean in USSR
w) 1963 " " "

Table 2

Development of rust on cereal crops in the USSR in 1964
(mean percentile harvest losses)

Form of rust	Republic, kray, oblast			
	moderate development		epiphytic outbreaks	
	Winter Rye			
Brown	Arkhangel'skaya Obl [oblast]	3.0	Bashkir ASSR	9.0
	Vologodskaya Obl	4.0	Former West Kazakhstanskiy Kray	5.0
	Volgogradskaya Obl	3.2	Kuybyshevskaya Obl	6.0
	Gor'kovskaya Obl	3.0	Moskovskaya Obl	5.0
	Ivanovskaya Obl	4.5	Orlovskaya Obl	8.8
	Kalininskaya Obl	4.0	Saratovskaya Obl	5.0
	Kaluzhskaya Obl	3.0	Ul'yanovskaya Obl	5.0
	Kiyevskaya Obl	3.0		
	Leningradskaya Obl	3.0		
	Penzenskaya Obl	4.0		
	Permskaya Obl	3.0		
	Tatar ASSR	3.0		
	Cherkasskaya Obl			
Yellow	Moskovskaya Obl	3.0	Lipetskaya Obl	11.3
			Mordovskaya ASSR	15.3
Common	Ivanovskaya Obl	4.5	Vologodskaya Obl	15.0
	Kurskaya Obl	3.4	Kuybyshevskaya Obl	5.0
	Minskaya Obl	3.5	Leningradskaya Obl	10.0
	Orlovskaya Obl	2.0	Moskovskaya Obl up to 60.0 in some areas	
	Penzenskaya Obl	3.4	Estonian SSR	7.0
	Winter Wheat			
Brown	Azerbaydzhan SSR	3.0	Vinnitskaya Obl	6.5
	Volgogradskaya Obl	3.0	Zaporozhskaya Obl	20.0
	Kalininskaya Obl	4.0	Kostromskaya Obl	8.8
	Kaluzhskaya Obl	3.0	Kuybyshevskaya Obl	5.0
	Penzenskaya Obl	3.0	Latvian SSR	6.0
	Permskaya Obl	3.0	Moskovskaya Obl	5.0
	Ryazanskaya Obl	3.0	Saratovskaya Obl	5.0
	Turkmen SSR	3.0	Chernovitskaya Obl	5.0
Yellow	Azerbaydzhan SSR	3.0	Lipetskaya Obl	33.0
	Moskovskaya Obl	3.0		
Common	Saratovskaya Obl	3.0	Moskovskaya obl up to 60.0 in some areas	

Table 2 (continued)

Form of rust	Republic, kray, oblast — moderate development		epiphytic outbreaks	
Spring Wheat				
Brown	Volgogradskaya Obl	3.0	Vologodskaya Obl	20.0
	Ivanovskaya Obl	2.5	Former West Kazakhstan. Kray	5.0
	Kostromskaya Obl	4.5	Karagandinskaya Obl	7.4
	Penzenskaya Obl	3.0	Kuybyshevskaya Obl	15.0
			Orenburgskaya Obl	10.0
			Omskaya Obl	6.0
			Saratovskaya Obl	10.0
			Tatar ASSR	15.0
			Ul'yanovskaya Obl	5.0
			Yaroslavskaya Obl	8.8
			Tselinnyy Kray	8.8
Yellow	Gor'kovskaya Obl	2.5	Mordovskaya ASSR	15.5
	Kirgiz SSR	3.4	Tambovskaya Obl	11.3
	Latvian SSR	5.8		
Common	Omskaya Obl	3.4	Orlovskaya Obl	11.0
	Chitinskaya Obl	4.0	Semipalatinskaya Obl	5.0
Barley				
Dwarf	Moskovskaya Obl	3.0	Tselinnyy Kray	10.0
	Ryazanskaya Obl	3.0	Former West Kazakhstan. Kray	5.0
			Kamchatskaya Obl	8.8
			Tselinnyy Kray	7.0
Yellow	Kirgiz SSR	3.4	Alma-Atinskaya Obl	9.0
	Moskovskaya Obl	3.0		
Common	Karagandinskaya Obl	3.0	Former West Kazakhstan. Kray	9.0
	Tselinnyy Kray	4.0	Chuvashskaya ASSR	8.0
	Chitinskaya Obl	4.0		
Oats				
Crown	Former West Kazakhstan. Kray	5.0		
	Kuybyshevskaya Obl	5.0		
Common	Chuvashskaya ASSR	8.0		

Table 3

Intensity of invasion (percentile) of Bezostaya 1 wheat by rust in 1964 as related to altitude ["vertical zonality"] (according to data of G.R. Ibragimov)

Вид ржавчины	Высота над уровнем моря		
	равнина — 0—200 м	предгорье — 600—800 м	горная зона — 1000—1800 м
Линейная	4	8	25
Желтая	3	30	40
Бурая	8	50	85

Legend:

a) Form of rust
b) altitude above sea level
c) plain, 0-200 meters
d) foothills, 600-800 meters
e) mountain zone, 1000-1800 meters
f) common
g) yellow
h) brown

Epiphytic outbreaks were noted in spring wheat in Tselinnyy Kray, Northern Povolzh'ye, Omskaya and other oblasts. As a rule soft wheat was more affected than hard varieties. In addition to those indicated in Table 4 the most resistant cultivars included Gor'kovskaya 21 (4%), Melanopus 69 (5%), Khar'kovskaya 46, Chelyabinskaya, Smuglyanka and Narodnaya (up to 8%). In the case of late sowing the leaves were more affected by the fungus due to prolongation of plant vegetation. Thus in the southern forest steppe regions of Omskaya Oblast by the end of July the leaves of late maturing Milturum 553, which occupied over 50% of the area, were almost entirely destroyed by rust.

Yellow rust (Puccinia glumarum Er. et Henn.) was encountered in all zones, but mostly in a mild form. Harvest losses for all of USSR constituted 1.56%. Epiphytic outbreaks were observed in rye and wheat in some oblasts of the Nonchernozem, Forest-steppe, Steppe zones and in virgin lands. Particularly great losses of harvest were recorded in Lipetskaya Oblast referable to Stepnaya 135 wheat whose leaves, leaf ocrea and blossom scales were totally affected. The fungus developed mildly on Bezostaya 1. The total loss in the oblast with respect to wheat harvest constituted about 33%.

Common rust (Puccinia graminis Pers) broke out for the first time in many years on spring wheat in Tselinnyy Kray. In some fields, prior to harvesting there was intensive invasion of the plants: in Kustanayskaya and Kokchetavskaya (up to 65%), Karagandinskaya and Tselinogradskaya (up to 45%), Semipalatinskaya (up to 30%), North-Kazakhstanskaya and Pavlodarskaya (up to 15%) oblasts. Simultaneously the wheat in this area was also markedly invaded by brown rust (V.M. Makarov). All this was apparently the result of reproduction of local infection in view of the unusually wet summer when the hydrothermic index approximated 1.70 (V.I. Kandaurov).

Typically enough, for example in Kokchetavskaya Oblast, only Khar'kovskaya 46 cultivar was strongly invaded.

Table 4

Brown rust invasion of hard and soft varieties of spring wheat in 1964

Сорт пшеницы (a)	Интенсивность поражения (процент) (b)	Край, область (c)
Мягкие пшеницы (m)		
Лютесценс 758 (d)	62,6	
Мильтурум 553 (e)	60,3	
Саратовская 29 (f)	60,2	Целинный край (o)
Акмолинка (g)	50,0	
Смена (h)	50,0	
Заволжская (i)	48,0	Куйбышевская обл. (p)
Твердые пшеницы (n)		
Гордеиформе 10 (j)	5,0	
Гордеиформе 189 (j)	5,0	Целинный край (o)
Народная (k)	5,0	
Безенчукская 105 (l)	1,0	
Безенчукская 102 (l)	0,0	Куйбышевская обл. (p)

Legend:

a) wheat variety
b) intensity of invasion (%)
c) kray, oblast
d) lutescence 758
e) Milturum 553
f) Saratovskaya 29
g) Akmolinka
h) Smena
i) Zavolzhskaya
j) Hordeiforme ...
k) Narodnaya
l) Bezenchukskaya ...
m) soft wheats
n) hard wheats
o) Tselinnyy Kray
p) Kuybyshevskaya Oblast

The fungus inflicted appreciable losses of rye and winter wheat harvest in the Nonchernozem Zone. In some parts of Moskovskaya Oblast the harvest losses constituted 60% or more. In Vologodskaya, Leningradskaya, Orlovskaya and some other oblasts the rejected grain due to disease ranged from 10 to 15% of the biological harvest.

Barley and oats were invaded by common rust by up to 30-32% in Chuvash Autonomous SSR and former West Kazakhstanskiy Kray, which could cause an 8-9% harvest loss.

Crown rust (Puccinia coronifera Kleb.) was distributed in all areas of oat cultivation, but as a rule at a low intensity and over small areas. Epiphytic outbreaks were observed only in Kuybyshevskaya Oblast and former West Kazakhstanskiy Kray. In Estonian SSR Vigor, Bandi and Pshebui-2 were found to be immune, while Palu (44%) and Khamarik (38) were the most susceptible. In North Kazakhstanskaya Oblast the fungus developed intensively on Zolotoy doshd' (up to 55%) and Pobeda (up to 57%).

Dwarf rust (Puccinia anomale Rostr.) was observed in all areas. The fungus developed intensively in Eastern Siberia. In Novosibirskaya Ob Oblast barley harvest losses constituted 4.5% and in Tselinnyy Kray they reached 7%. In the other oblasts no epiphytic outbreaks were recorded. There was visible invasion of Pallidum 30 and Pallidum 187 cultivars (from 24 to 27%) at the Mozdok State Strain Testing Plot. At the same time there was mild involvement of Ketzoras-Beta and Geaginskiy 395 (from 6 to 9%).

Maize rust (Puccinia sorghi Scheg.) showed mild development in Georgia and mainly in the Ukraine. The article by F.Ye. Nemliyenko and G.V. Grisenko in this same collection furnishes more detailed information.

The increase in rust invasion of a number of crops in 1964 may be attributed to the favorable weather conditions for pathogens, inadequate institution of agrotechnical protective measures, including slow introduction of resistant and sturdy cultivars. In order to reduce cereal crop losses due to rust complexes of control measures should be instituted on a broader scale. In addition the work of the regional service should be organized to observe the rust strains.

*A.Ye. Chumakov: Zashchita pshenitsy ot rzhavchiny (Protection of Wheat from Rust), Kolos Press, 1964.